XIII. Y793605

Lherzolite, 16 grams

"moderately weathered"

Figure XIII-1. *Photograph of Martian meteorite Y793605 contributed by Dr. H. Kojima, NIPR.*

Introduction

In a survey of diogenites in the Japanese Antarctic Meteorite Collection, Yanai (1995) reported a sample of "type D orthopyroxenite" with intermediate plagioclase composition (shocked maskelynite) and speculated that it might be from Mars. This sample (originally designated Y79-25) was collected from the Yamato Mountain site in 1979 (figure XIII-1).

Mikouchi and Miyamoto (1996b) found that Y793605 *"shows strong affinities to both ALHA77005 and LEW88516 in petrography and mineral chemistry"*. The rock is "moderately weathered". On one surface there is *"fairly extensive rusting (orange discoloration). A few tiny, elongate grains of bright white material (evaporites?) are noted, clustered in several small regions"* (Warren, personal communication).

Petrography

The mode of Y793605 is roughly 60% pyroxene, 35% olivine, 5 % maskelynite and a trace of opaque (Warren, personal communication). Yanai (1995) reported a poikilitic texture, consisting mostly of coarse-grain pyroxene, granular olivine and interstitial plagioclase (maskelynite). Mikouchi and Miyamoto (1996a and b) reported both poikilitic and non-poikilitic (interstitial) areas separated by a continuous boundary (figure XIII-2). In the poikilitic area, a large pigeonite oikiocryst (7 mm) encloses rounded olivines (1 mm) and aggregates of euhedral chromite (< 100 microns). Patches of augite occur around the outer edges of the pigeonite oikiocryst. Some olivines contain magmatic inclusions containing high Al, pyroxene and Si-rich glass.

The non-poikilitic area is made up of olivine, pigeonite and interstitial maskelynite (each about 1 mm in size).

The sample has a large area of shock melt and also has veins of shock melt. The mafic minerals show undulatory extinction. No phosphates were observed (Mikouchi and Miyamoto, 1996 a,b).

Mineral Chemistry

Yanai 1995 reported mineral compositions for "type D diogenite" including intermediate plagioclase compositions. Mineral compositions, including minor

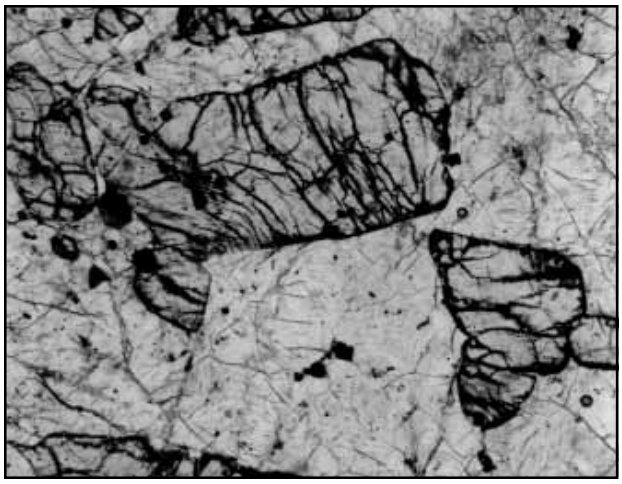

Figure XIII-2. *Photomicrograph of thin section of Y793605. Field of view is 2.2 mm. With permission of Dr. Kojima.*

elements, were reported by Mikouchi and Miyamoto (1996 a,b).

***Low-Ca pyroxene*:** The structural state of the low-Ca pyroxene is not known. The large oikiocryst studied by Mikouchi and Miyamoto (1996) was gradationally zoned from Wo_3Fs_{21} to $Wo_{11}Fs_{23}$ (figure XIII-3).

***Chromite*:** Chromite is zoned to ulvöspinel.

***Olivine*:** Olivine poikilitically enclosed in pigeonite is Fa_{26-30}. Olivine in the non-poikilitic area is Fa_{30-35}.

***Augite*:** The composition of the augite in the poikilitic region is Wo_{32-37} Fs_{16-14}.

***Maskelynite*:** Maskelynite is weakly zone An_{55} to An_{45}.

***Ilmenite*:** Minor ilmenite (MgO = 5%) has been reported (Mikouchi and Miyamoto, 1996b).

***Phosphates*:** Phosphates seem to be lacking in the thin sections studied.

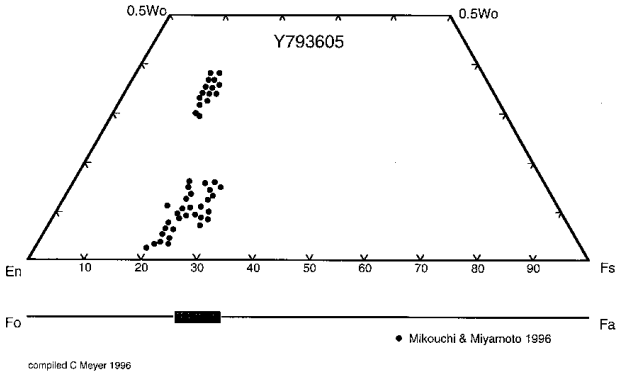

Figure XIII-3. *Composition diagram for pyroxene and olivine in Y793605. Data are from Mikouchi and Miyamoto (1996).*

Whole-rock Composition

Not known at this time.

Radiogenic Isotopes

None reported 1996.

Cosmogenic Isotopes and Exposure Ages

Not known.

Other Isotopes

Mayeda *et al*. (1995) and Clayton and Mayeda (1996) reported oxygen isotopes for Y793605 (figure I-2). It is Martian and provides hope that more Martian meteorites can be recognized.

Processing

This sample has been processed and allocated by the National Institute of Polar Research to a consortium led by Drs. Kojima, Miyamoto, Warren and Yanai.